

JAN 13 2003

1

SEQUENCE LISTING

<110> SHERMAN, LINDA A.
LUSTGARTEN, JOSEPH

<120> RECOMBINANT CONSTRUCTS ENCODING T CELL RECEPTORS
SPECIFIC FOR HUMAN HLA-RESTRICTED TUMOR ANTIGENS

<130> 46147/55793

<140> 08/812,393

<141> 1997-03-05

<160> 64

<170> PatentIn Ver. 2.1

<210> 1

<211> 1350

<212> DNA

<213> Artificial Sequence

<220>

<221> CDS

<222> (1)..(1332)

<220>

<223> Description of Artificial Sequence: Synthetic
single chain TCR derivative nucleotide sequence

<400> 1

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| ctc | gag | atg | cag | agg | aac | ctg | gga | gct | gtg | ctg | ggg | att | ctg | tgg | gtg | 48 |
| Leu | Glu | Met | Gln | Arg | Asn | Leu | Gly | Ala | Val | Leu | Gly | Ile | Leu | Trp | Val | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| cag | att | tgc | tgg | ctg | aaa | gaa | cag | caa | gtg | cag | cag | agt | ccc | gca | tcc | 96 |
| Gln | Ile | Cys | Trp | Leu | Lys | Glu | Gln | Gln | Val | Gln | Gln | Ser | Pro | Ala | Ser | |
| | | 20 | | | | | 25 | | | | | | 30 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ttg | gtt | ctg | cag | gag | ggg | gag | aac | gca | gag | ctc | cag | tgt | agc | ttt | tcc | 144 |
| Leu | Val | Leu | Gln | Glu | Gly | Glu | Asn | Ala | Glu | Leu | Gln | Cys | Ser | Phe | Ser | |
| | 35 | | | | | 40 | | | | | | 45 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| atc | ttt | aca | aac | cag | gtg | cag | tgg | ttt | tac | caa | cgt | cct | ggg | gga | aga | 192 |
| Ile | Phe | Thr | Asn | Gln | Val | Gln | Trp | Phe | Tyr | Gln | Arg | Pro | Gly | Gly | Arg | |
| | 50 | | | | | 55 | | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ctc | gtc | agc | ctg | ttg | tac | aat | cct | tct | ggg | aca | aag | cag | agt | ggg | aga | 240 |
| Leu | Val | Ser | Leu | Leu | Tyr | Asn | Pro | Ser | Gly | Thr | Lys | Gln | Ser | Gly | Arg | |
| | 65 | | | | 70 | | | | 75 | | | | | 80 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ctg | aca | tcc | aca | aca | gtc | att | aaa | gaa | cgt | cgc | agc | tct | ttg | cac | att | 288 |
| Leu | Thr | Ser | Thr | Thr | Val | Ile | Lys | Glu | Arg | Arg | Ser | Ser | Leu | His | Ile | |
| | | | 85 | | | | | 90 | | | | | | 95 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tcc | tcc | tcc | cag | atc | aca | gac | tca | ggc | act | tat | ctc | tgt | gcc | tca | aat | 336 |
| Ser | Ser | Ser | Gln | Ile | Thr | Asp | Ser | Gly | Thr | Tyr | Leu | Cys | Ala | Ser | Asn | |
| | | | 100 | | | | | 105 | | | | | | 110 | | |

| | |
|---|------|
| tct gga gga agc aat gca aag cta acc ttc ggg aaa ggc act aaa ctc | 384 |
| Ser Gly Gly Ser Asn Ala Lys Leu Thr Phe Gly Lys Gly Thr Lys Leu | |
| 115 120 125 | |
| tct gtt aaa tca ggt ggc gga ggg tct ggc ggg ggt gga tcc ggg ggt | 432 |
| Ser Val Lys Ser Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly | |
| 130 135 140 | |
| gga ggc tca gag gct gca gtc acc caa agc cca aga aac aag gtg gca | 480 |
| Gly Gly Ser Glu Ala Ala Val Thr Gln Ser Pro Arg Asn Lys Val Ala | |
| 145 150 155 160 | |
| gta aca gga gga aag gtg aca ttg agc tgt aat cag act aat aac cac | 528 |
| Val Thr Gly Gly Lys Val Thr Leu Ser Cys Asn Gln Thr Asn Asn His | |
| 165 170 175 | |
| aac aac atg tac tgg tat cgg cag gac acg ggg cat ggg ctg agg ctg | 576 |
| Asn Asn Met Tyr Trp Tyr Arg Gln Asp Thr Gly His Gly Leu Arg Leu | |
| 180 185 190 | |
| atc cat tat tca tat ggt gct ggc agc act gag aaa gga gat atc cct | 624 |
| Ile His Tyr Ser Tyr Gly Ala Gly Ser Thr Glu Lys Gly Asp Ile Pro | |
| 195 200 205 | |
| gat gga tac aag gcc tcc aga cca agc caa gag aac ttc tcc ctc att | 672 |
| Asp Gly Tyr Lys Ala Ser Arg Pro Ser Gln Glu Asn Phe Ser Leu Ile | |
| 210 215 220 | |
| ctg gag ttg gct acc ccc tct cag aca tca gtg tac ttc tgt gcc agc | 720 |
| Leu Glu Leu Ala Thr Pro Ser Gln Thr Ser Val Tyr Phe Cys Ala Ser | |
| 225 230 235 240 | |
| ggt gag aca ggg acc aac gaa aga tta ttt ttc ggt cat gga acc aag | 768 |
| Gly Glu Thr Gly Thr Asn Glu Arg Leu Phe Phe Gly His Gly Thr Lys | |
| 245 250 255 | |
| ctg tct gtc ctg act agt aac tcc atc atg tac ttc agc cac ttc gtg | 816 |
| Leu Ser Val Leu Thr Ser Asn Ser Ile Met Tyr Phe Ser His Phe Val | |
| 260 265 270 | |
| ccg gtc ttc ctg cca gcg aag ccc acc acg acg cca gcg ccg cga cca | 864 |
| Pro Val Phe Leu Pro Ala Lys Pro Thr Thr Thr Pro Ala Pro Arg Pro | |
| 275 280 285 | |
| cca aca ccg gcg ccc acc atc gcg tcg cag ccc ctg tcc ctg cgc cca | 912 |
| Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln Pro Leu Ser Leu Arg Pro | |
| 290 295 300 | |
| tct agt tct aga gat ccc aaa ctc tgc tac ctg ctg gat gga atc ctc | 960 |
| Ser Ser Ser Arg Asp Pro Lys Leu Cys Tyr Leu Leu Asp Gly Ile Leu | |
| 305 310 315 320 | |
| ttc atc tat ggt gtc att ctc act gcc ttg ttc ctg aga gtg aag ttc | 1008 |
| Phe Ile Tyr Gly Val Ile Leu Thr Ala Leu Phe Leu Arg Val Lys Phe | |
| 325 330 335 | |

agc agg agc gca gac gcc ccc gcg tac cag cag ggc cag aac cag ctc 1056
 Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln Leu
 340 345 350
 tat aac gag ctc aat cta gga cga aga gag gag tac gat gtt ttg gac 1104
 Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu Asp
 355 360 365
 aag aga cgt ggc cgg gac cct gag atg ggg gga aag ccg aga agg aag 1152
 Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg Lys
 370 375 380
 aac cct cag gaa ggc ctg tac aat gaa ctg cag aaa gat aag atg gcg 1200
 Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met Ala
 385 390 395 400
 gag gcc tac agt gag att ggg atg aaa ggc gag cgc cgg agg ggc aag 1248
 Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly Lys
 405 410 415
 ggg cac gat ggc ctt tac cag ggt ctc agt aca gcc acc aag gac acc 1296
 Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp Thr
 420 425 430
 tac gac gcc ctt cac atg cag gcc ctg ccc cct cgc taa gcg gcc gcc 1344
 Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
 435 440
 acc gcg 1350

<210> 2

<211> 444

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
single chain TCR protein

<400> 2

Leu Glu Met Gln Arg Asn Leu Gly Ala Val Leu Gly Ile Leu Trp Val
 1 5 10 15
 Gln Ile Cys Trp Leu Lys Glu Gln Gln Val Gln Gln Ser Pro Ala Ser
 20 25 30
 Leu Val Leu Gln Glu Gly Glu Asn Ala Glu Leu Gln Cys Ser Phe Ser
 35 40 45
 Ile Phe Thr Asn Gln Val Gln Trp Phe Tyr Gln Arg Pro Gly Gly Arg
 50 55 60
 Leu Val Ser Leu Leu Tyr Asn Pro Ser Gly Thr Lys Gln Ser Gly Arg
 65 70 75 80
 Leu Thr Ser Thr Thr Val Ile Lys Glu Arg Arg Ser Ser Leu His Ile
 85 90 95

Ser Ser Ser Gln Ile Thr Asp Ser Gly Thr Tyr Leu Cys Ala Ser Asn
 100 105 110
 Ser Gly Gly Ser Asn Ala Lys Leu Thr Phe Gly Lys Gly Thr Lys Leu
 115 120 125
 Ser Val Lys Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly
 130 135 140
 Gly Gly Ser Glu Ala Ala Val Thr Gln Ser Pro Arg Asn Lys Val Ala
 145 150 155 160
 Val Thr Gly Gly Lys Val Thr Leu Ser Cys Asn Gln Thr Asn Asn His
 165 170 175
 Asn Asn Met Tyr Trp Tyr Arg Gln Asp Thr Gly His Gly Leu Arg Leu
 180 185 190
 Ile His Tyr Ser Tyr Gly Ala Gly Ser Thr Glu Lys Gly Asp Ile Pro
 195 200 205
 Asp Gly Tyr Lys Ala Ser Arg Pro Ser Gln Glu Asn Phe Ser Leu Ile
 210 215 220
 Leu Glu Leu Ala Thr Pro Ser Gln Thr Ser Val Tyr Phe Cys Ala Ser
 225 230 235 240
 Gly Glu Thr Gly Thr Asn Glu Arg Leu Phe Phe Gly His Gly Thr Lys
 245 250 255
 Leu Ser Val Leu Thr Ser Asn Ser Ile Met Tyr Phe Ser His Phe Val
 260 265 270
 Pro Val Phe Leu Pro Ala Lys Pro Thr Thr Thr Pro Ala Pro Arg Pro
 275 280 285
 Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln Pro Leu Ser Leu Arg Pro
 290 295 300
 Ser Ser Ser Arg Asp Pro Lys Leu Cys Tyr Leu Leu Asp Gly Ile Leu
 305 310 315 320
 Phe Ile Tyr Gly Val Ile Leu Thr Ala Leu Phe Leu Arg Val Lys Phe
 325 330 335
 Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln Leu
 340 345 350
 Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu Asp
 355 360 365
 Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg Lys
 370 375 380
 Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met Ala
 385 390 395 400

Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly Lys
 405 410 415

Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp Thr
 420 425 430

Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
 435 440

<210> 3
 <211> 24
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 3
 cccaaggcac tgatgttcac ctcc 24

<210> 4
 <211> 27
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 4
 tgagacaaag tccccaatct ctgacag 27

<210> 5
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 5
 ctgcagctgc tcctcaagta ctattc 26

<210> 6
 <211> 28
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 6
 tccccgagaa ggtccacagt tcctcttt 28

<210> 7
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 7
gaagcagcag agggtttgaa gccacatac 29

<210> 8
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 8
ggcaggtctt cagttgctta tgaaggt 27

<210> 9
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 9
ggttcctctt cagggtccag aatatgt 27

<210> 10
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 10
gcgaagaact caccctggac tgttcat 27

<210> 11
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 11
gagctccaca gacaacaaga ggacgcagca 30

<210> 12
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 12
gagctgcgac gttccttagt gactgtg 27

<210> 13
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 13
cctcgtcagc ctgttgcca atccttcgg 30

<210> 14
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 14
cagcctcatc aatctgttct acttggt 28

<210> 15
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 15
ccaccaggga ccacagtta tcattcaa 28

<210> 16
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 16
acctggagag aatcctaagc tcatcat 27

<210> 17
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 17
aggtcttgtg tccctgacag tcttggtt 28

<210> 18
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 18
caagcaaaca ctgtagtgca gagcccttcc 30

<210> 19
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 19
caagacatcc ataactgccc tacag 25

<210> 20
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 20
gtgtatgaaa cccaggacag ttcttac 27

<210> 21
<211> 29
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 21

ccgtatttct ttcttatggt gttttggat

29

<210> 22

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 22

caaagctctc catcgctgac tgttcaag

28

<210> 23

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 23

atctaattcct gggaagagca aat

23

<210> 24

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 24

ggcgtctggt accacgtggt caa

23

<210> 25

<211> 23

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 25

gtgaaagggc aaggacaaa agc

23

<210> 26

<211> 22

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 26
gatatgcgaa cagtatctag gc 22

<210> 27
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 27
acataatcaa aggaaaggga gaa 23

<210> 28
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 28
tcctgattgg tcaggaaggg caa 23

<210> 29
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 29
tacctgatca aaagaatggg aga 23

<210> 30
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 30
ataaccatga caatatgtac tgg 23

<210> 31
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 31
 ataaccacaa caacatgtac tgg 23

<210> 32
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 32
 atagccacaa ctacatgtac tgg 23

<210> 33
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 33
 agcttgcaag agttggaaaa cca 23

<210> 34
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 34
 gattatgttt agctacaata ata 23

<210> 35
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Primer

<400> 35
 acaaggtgac agggaaggga caa 23

<210> 36
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 36
acctacagaa cccaaggact cag 23

<210> 37
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 37
cagttgccct cggatcgatt ttc 23

<210> 38
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 38
gccgagatca aggctgtggg cag 23

<210> 39
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 39
agaaccatct gtaagagtgg aac 23

<210> 40
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer

<400> 40
catcaaataa tagatatggg gca

23

<210> 41
<211> 23
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 41
gtagtcctga aaaagggcac act

23

<210> 42
<211> 22
<212> DNA
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Primer

<400> 42
catctgtcaa agtggcactt ca

22

<210> 43
<211> 393
<212> DNA
<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(393)

<400> 43
atg aaa tcc ttg agt gtt tcc cta gtg gtc ctg tgg ctc cag tta aac 48
Met Lys Ser Leu Ser Val Ser Leu Val Val Leu Trp Leu Gln Leu Asn
1 5 10 15
tgg gtg cag agc cag cag aag gtg cag cag agc cca gaa tcc ctc agt 96
Trp Val Gln Ser Gln Gln Lys Val Gln Gln Ser Pro Glu Ser Leu Ser
20 25 30
gtc cca gag gga ggc atg gcc tct ctc aac tgc act tca agt gat cgc 144
Val Pro Glu Gly Gly Met Ala Ser Leu Asn Cys Thr Ser Ser Asp Arg
35 40 45
aat ttt cag tat ttc tgg tgg tac aga cag cat tct gga gaa ggc ccc 192
Asn Phe Gln Tyr Phe Trp Trp Tyr Arg Gln His Ser Gly Glu Gly Pro
50 55 60
aaa gca ctg atg tcc atc ttc tct gat ggt gac aag aaa gaa ggc aga 240
Lys Ala Leu Met Ser Ile Phe Ser Asp Gly Asp Lys Lys Glu Gly Arg
65 70 75 80

ttc aca gct cac ctc aat aag gcc agc ctg cat gtt tcc ctg cac atc 288
 Phe Thr Ala His Leu Asn Lys Ala Ser Leu His Val Ser Leu His Ile
 85 90 95

aga gac tcc cag ccc agt gac tcc gct ctc tac ttc tgt gca gtt atg 336
 Arg Asp Ser Gln Pro Ser Asp Ser Ala Leu Tyr Phe Cys Ala Val Met
 100 105 110

gat tat aac cag ggg aag ctt atc ttt ggg cag ggt acc aag tta tct 384
 Asp Tyr Asn Gln Gly Lys Leu Ile Phe Gly Gln Gly Thr Lys Leu Ser
 115 120 125

atc aag ccc 393
 Ile Lys Pro
 130

<210> 44

<211> 131

<212> PRT

<213> Homo sapiens

<400> 44

Met Lys Ser Leu Ser Val Ser Leu Val Val Leu Trp Leu Gln Leu Asn
 1 5 10 15

Trp Val Gln Ser Gln Gln Lys Val Gln Gln Ser Pro Glu Ser Leu Ser
 20 25 30

Val Pro Glu Gly Gly Met Ala Ser Leu Asn Cys Thr Ser Ser Asp Arg
 35 40 45

Asn Phe Gln Tyr Phe Trp Trp Tyr Arg Gln His Ser Gly Glu Gly Pro
 50 55 60

Lys Ala Leu Met Ser Ile Phe Ser Asp Gly Asp Lys Lys Glu Gly Arg
 65 70 75 80

Phe Thr Ala His Leu Asn Lys Ala Ser Leu His Val Ser Leu His Ile
 85 90 95

Arg Asp Ser Gln Pro Ser Asp Ser Ala Leu Tyr Phe Cys Ala Val Met
 100 105 110

Asp Tyr Asn Gln Gly Lys Leu Ile Phe Gly Gln Gly Thr Lys Leu Ser
 115 120 125

Ile Lys Pro
 130

<210> 45

<211> 402

<212> DNA

<213> Homo sapiens

<220>

<221> CDS

<222> (1)..(402)

<400> 45

```

atg ggc tcc aga ctc ttc ttt gtg gtt ttg att ctc ctg tgt gca aaa 48
Met Gly Ser Arg Leu Phe Phe Val Val Leu Ile Leu Leu Cys Ala Lys
1 5 10 15

cac atg gag gct gca gtc acc caa agt cca aga agc aag gtg gca gta 96
His Met Glu Ala Ala Val Thr Gln Ser Pro Arg Ser Lys Val Ala Val
20 25 30

aca gga gga aag gtg aca ttg agc tgt cac cag act aat aac cat gac 144
Thr Gly Gly Lys Val Thr Leu Ser Cys His Gln Thr Asn Asn His Asp
35 40 45

tat atg tac tgg tat cgg cag gac acg ggg cat ggg ctg agg ctg atc 192
Tyr Met Tyr Trp Tyr Arg Gln Asp Thr Gly His Gly Leu Arg Leu Ile
50 55 60

cat tac tca tat gtc gct gac agc acg gag aaa gga gat atc cct gat 240
His Tyr Ser Tyr Val Ala Asp Ser Thr Glu Lys Gly Asp Ile Pro Asp
65 70 75 80

ggg tac aag gcc tcc aga cca agc caa gag aat ttc tct ctc att ctg 288
Gly Tyr Lys Ala Ser Arg Pro Ser Gln Glu Asn Phe Ser Leu Ile Leu
85 90 95

gag ttg gct tcc ctt tct cag tca gct gta tat ttc tgt gcc agc agc 336
Glu Leu Ala Ser Leu Ser Gln Ser Ala Val Tyr Phe Cys Ala Ser Ser
100 105 110

gat ttc gcc ggg aca ggg ggc ttc tat gaa cag tac ttc ggt ccc ggc 384
Asp Phe Ala Gly Thr Gly Gly Phe Tyr Glu Gln Tyr Phe Gly Pro Gly
115 120 125

acc agg ctc acg gtt tct 402
Thr Arg Leu Thr Val Ser
130

```

<210> 46

<211> 134

<212> PRT

<213> Homo sapiens

<400> 46

```

Met Gly Ser Arg Leu Phe Phe Val Val Leu Ile Leu Leu Cys Ala Lys
1 5 10 15

His Met Glu Ala Ala Val Thr Gln Ser Pro Arg Ser Lys Val Ala Val
20 25 30

Thr Gly Gly Lys Val Thr Leu Ser Cys His Gln Thr Asn Asn His Asp
35 40 45

```

Tyr Met Tyr Trp Tyr Arg Gln Asp Thr Gly His Gly Leu Arg Leu Ile
 50 35 60
 His Tyr Ser Tyr Val Ala Asp Ser Thr Glu Lys Gly Asp Ile Pro Asp
 65 70 75 80
 Gly Tyr Lys Ala Ser Arg Pro Ser Gln Glu Asn Phe Ser Leu Ile Leu
 85 90 95
 Glu Leu Ala Ser Leu Ser Gln Ser Ala Val Tyr Phe Cys Ala Ser Ser
 100 105 110
 Asp Phe Ala Gly Thr Gly Gly Phe Tyr Glu Gln Tyr Phe Gly Pro Gly
 115 120 125
 Thr Arg Leu Thr Val Ser
 130

<210> 47

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 47

Lys Ile Phe Gly Ser Leu Ala Phe Leu
 1 5

<210> 48

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 48

Thr Leu Gln Gly Leu Gly Ile Ser Trp Leu
 1 5 10

<210> 49

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 49

Val Met Ala Gly Val Gly Ser Pro Tyr Val
1 5 10

<210> 50

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 50

Val Leu Gln Gly Leu Pro Arg Glu Tyr Val
1 5 10

<210> 51

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 51

His Leu Tyr Gln Gly Cys Gln Val Val
1 5

<210> 52

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 52

Arg Leu Leu Gln Glu Thr Glu Leu Val
1 5

<210> 53

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 53

Lys Ile Pro Val Ala Ile Lys Val Leu
1 5

<210> 54

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 54

Cys Leu Thr Ser Thr Val Gln Leu Val
1 5

<210> 55

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 55

Gln Leu Met Pro Tyr Gly Cys Leu Leu
1 5

<210> 56

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 56

Val Leu Val Lys Ser Pro Asn His Val
1 5

<210> 57

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 57

Asp Ile Asp Glu Thr Glu Tyr His Ala
1 5

<210> 58

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 58

Asp Leu Leu Glu Lys Gly Glu Arg Leu
1 5

<210> 59

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 59

Glu Leu Val Ser Glu Phe Ser Arg Met
1 5

<210> 60

<211> 10

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 60

Glu Leu Val Ser Glu Phe Ser Arg Met Ala
1 5 10

<210> 61

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 61

Leu Val Ser Glu Phe Ser Arg Met Ala
1 5

<210> 62

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 62

Asp Leu Val Asp Ala Glu Glu Tyr Leu
1 5

<210> 63

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 63

Thr Leu Ser Pro Gly Lys Asn Gly Val
1 5

<210> 64

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
peptide

<400> 64

Lys Leu Val Gly Lys Leu Asn Trp Ala
1 5